Whitebark Pine: Holding on in the High Country

In the Greater Yellowstone Area (GYA), whitebark pine (*Pinus albicaulis*) grows on high-elevation slopes and ridges in what is known as the subalpine zone. Whitebark pine depends upon disturbances such as fire to create conditions favorable for establishment of new seedlings. It also depends upon a large jay known as the Clark's nutcracker to spread and plant whitebark pine seeds. Over the course of a year, the nutcracker caches or buries thousands of seeds. With an excellent memory, the jay recovers most but not all of the seeds. Some of the undiscovered seeds germinate providing for a new generation of trees.

Whitebark pine is important because the nuts from the pine cones are one of the four primary food sources for GYA grizzly bears. From year to year, the grizzlies' individual food sources vary, but they depend heavily on whitebark pine nuts, army cutworm moths, cutthroat trout, and winterkilled ungulates. Whitebark pine is important because unlike some of the other food sources, it is distributed throughout the ecosystem, and it is a fall food source that is high in fat, which allows the bears to put on weight right before hibernation. In the absence of fire or other disturbances, some whitebark pine stands can be overtaken by more shade tolerant species such as alpine fir and Engelmann spruce, resulting in declining cone production.

Whitebark pine.

Whitebark pine is also threatened by an exotic disease known as white pine blister rust. Imported from Europe in 1910, the rust has decimated stands of white pine, limber pine, and whitebark pine. Blister rust has not harmed the whitebark pine in the GYA to the same extent it has farther west. In Glacier National Park, blister rust has effectively rendered whitebark pine "biologically extinct," as the trees are no longer able to produce cones. In the GYA, preliminary field research shows the infection rate is between 10 and 12 percent.

The weather in the GYA plays a big role in slowing down the rate of infestation. The fungus is transmitted to the trees during periods of high relative humidity, which is much more common in a maritime climate rather than in the continental climate found in the GYA.

There are several strategies to restore and maintain whitebark pine populations in the path of the blister rust and forest succession. Where whitebark stands are being overtaken by spruce and fir, whitebark pine can be favored by removing the spruce and fir with fire or other means. Prescribed fire adjacent to existing whitebark stands may create conditions favorable for whitebark regeneration. Researchers already know that some whitebark pine trees—perhaps one in 1,000—are resistant to the disease. If managers can identify healthy trees in a stand where everything around them is infected, foresters can collect seeds from cones for growing resistant seedlings in nurseries. Geneticists are working on tissue cloning and branch rooting to help find ways to inoculate the trees and hopefully come up with a solution to the blister rust infestation.

Foresters are gathering seeds and growing seedlings at two Forest Service nurseries. In 1999, crews were able to gather about 133 pounds of seeds—an estimated 500,000 seeds—to be used in reforestation work. In fiscal year 2000, the GYCC helped fund whitebark pine planting projects on the Caribou-Targhee, Gallatin, and Shoshone National Forests.

Inventory and monitoring whitebark pine, given its widespread distribution and remote, high elevation locations, can be an expensive and difficult task. Yet there is a critical need to understand what is happening to this vital component of the ecosystem. The GYCC funded a project with Yellowstone Ecosystems Studies to test hyperspectral remote sensing of whitebark pine to see if the new technology can be used to gauge the health of select stands in different areas around the GYA. The blister rust that infects the trees first kills the upper crown. Special cameras can detect the diseased portion and tell researchers which stands show some signs of infection, and how badly individual trees are infected.

The Whitebark Pine Cooperative will continue to work on conservation of this critical species in the GYA. Areas of cooperative work include identification of disease resistant trees, cultivation of resistant seedlings at nurseries, coordinated inventory and monitoring, development of management guidelines, implementation of stand treatments and prescribed burns, and identification of research priorities.

For additional information to www.whitebarkfound.org.

Greater Yellowstone Area: Whitebark Pine Distribution within the Grizzly Recovery Area